results. H. H. Campbell sees the main difficulties in this process in the powerful effervescence of the bath during the first period of decarburisation, owing to which working is very inconvenient in ordinary fixed open-hearth furnaces. The bath rises, and slag, indeed also metal, reach the acid portions of the furnace structure, at times even flowing into the regenerator chambers, thus soon bringing the furnace to an early stoppage, if one does not elect to permit slag to run over the door sills^on to the working platform, whereby again approach to the furnace is rendered difficult or made quite impossible. Campbell overcame these difficulties by means of employing a tilting furnace of his own design, which differed from the "Wellmann construction, in that the gas and air ports, and therewith the heating action, did not require to bo broken off when the furnace was tipped. Molten pig iron was introduced into this furnace direct from the blast furnace on to properly prepared quantities of ore and limestone. Campbell •describes the course of this process as follows (p. 211) :—

" During the combustion of silicon, no violent reaction occurs, but immediately afterward a general movement takes place, whereupon the furnace is tipped over until the metal is thrown away from the doors and up on the back Bide. In this way, the capacity of the furnace is practically doubled, while the flame enters and goes out as usual. The furnace in kept in this position for two or three hour-s, until the bath has quieted down. Meanwhile, the slag is trying to froth out of the ends of the furnace and down the ports, but to do HO it must flow over the open joint between the ports and the furnace. This joint is not wide, but special provision is made to allow the slag to run out through a small hole and fall down beneath the end of the furnace in a slag pit. In this way, a considerable quantity is removed, and the time of the operation lessened/7

Further, he says :—" This practice of using direct metal has been in more or less continuous use for several years on furnaces of fifty tons capacity. Working in this way, the iron of the ore is reduced in such quantity that the product of stool, counting both ingots and scrap, exceeds the weight of pig iron charged by from 4 to 6 per cent, when the charge is entirely pig iron."